7.4 Homework

Additional Mathematics
A-Level Pure Mathematics : Year 1
Topics in Algebra

Any solution based entirely on graphical
or numerical methods is not acceptable
Marks available : 50

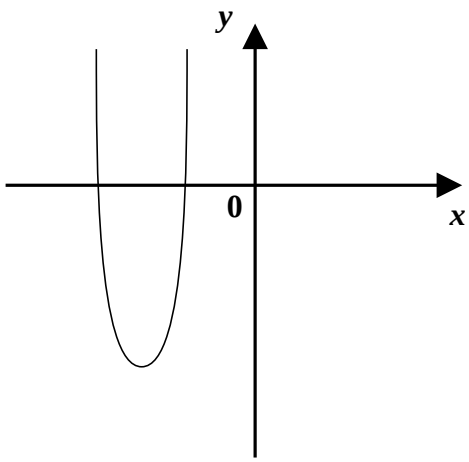
Question 1

Consider the curve, $y = x^2 + 10x + 13$

(i) Rewrite the equation of the curve in completed square form.

[1 mark]

(ii) Hence add the coordinates of the minimum point to the sketch graph.



[1 mark]

(iii) What is the minimum value of the function $f(x) = x^2 + 10x + 13$?

[1 mark]

Question 2

Factorise completely;

(i) $x^2 + 11x + 28$

(ii) $x^2 + x - 30$

(iii) $3x^2 - 14x + 16$

(iv) $2x^2 + x - 36$

[1, 1, 2, 2 marks]

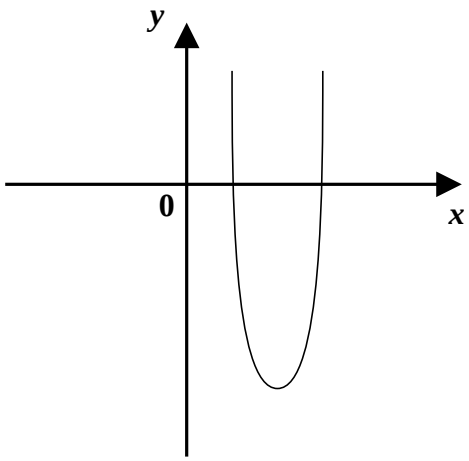
Question 3

Consider the curve, $y = x^2 - 12x - 21$

(i) Rewrite the equation of the curve in completed square form.

[1 mark]

(ii) Hence add the coordinates of the minimum point to the sketch graph.



[1 mark]

(iii) For what value of x does the function $f(x) = x^2 - 12x - 21$ have its minimum value ?

[1 mark]

Question 4

Solve the following equations;

(i) $x^2 + 7x - 8 = 0$ **(ii)** $x^2 - 2x - 35 = 0$

(iii) $3x^2 + 17x + 10 = 0$ **(iv)** $5x^2 + 4x - 33 = 0$

[2, 2, 3, 3 marks]

Question 5

Consider the curve, $y = 4x^2 + 24x + 11$

(i) Rewrite the equation of the curve in completed square form.

[4 marks]

(ii) Hence sketch the graph of the curve with the coordinates of its minimum point clearly marked

[3 marks]

Question 6

Find the value of,

(i) $25^{\frac{3}{2}}$ **(ii)** $27^{\frac{2}{3}}$ **(iii)** $\left(\frac{3}{2}\right)^{-4}$

[1, 1, 1 marks]

Question 7

Write each of the following in the form $a\sqrt{b}$ where a and b are integers and b is also square free;

(i) $\sqrt{45}$ **(ii)** $\frac{6}{\sqrt{2}}$ **(iii)** $\frac{\sqrt{108}}{\sqrt{6}}$

[1, 1, 1 marks]

Question 8

Showing your method, rationalise the denominator of, $\frac{5 + \sqrt{3}}{3 - \sqrt{3}}$ and present your final answer in the form $a + b\sqrt{3}$ where a and b are constants to be found

[5 marks]

Question 9

(i) Find the values of a, b and c for which

$$5x^2 - 40x + 81 \equiv a(x + b)^2 + c$$

[4 marks]

(ii) Hence state the minimum value of the function,

$$f(x) = 5x^2 - 40x + 81$$

[1 mark]

Question 10

(i) Find the values of a, b and c for which

$$4x^2 - 12x + 25 \equiv a(x + b)^2 + c$$

[4 marks]

(ii) Hence state the minimum value of the function,

$$f(x) = 4x^2 - 12x + 25$$

[1 mark]